



Research Aid

Production of Machinery and Equipment in the Peoples Republic of China

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This handbook presents estimates of China's annual production of some 30 major items of machinery and equipment for all or parts of 1949-73. It is intended to supplement other research on the topic.¹

Table 1 groups the estimates in the order in which the products appear in the State Statistical Bureau's standard industrial classification code²; it also serves as an index of page numbers for locating specific production series. Table 2 lists the space-saving abbreviations adopted for citing the principal sources of information.

Tables 3 through 9 present the estimates, with footnotes indicating the sources and methodologies used in deriving the estimates. Because estimating production by China's merchant shipbuilding industry involved unique difficulties, the methodology is described separately in Appendix A.

Note: Data in parentheses are calculated residuals. Computations in the methodology are, in general, based on unrounded data, and the results have been rounded.

¹ Kang Chao, *Capital Formation in Mainland China, 1952-65*, Berkeley, University of California Press, 1974; Chu-yuan Cheng, *The Machine-Building Industry in Communist China*, New York, Aldine Press, 1971; Robert Michael Field, "The Chinese Machine-Building Industry: A Reappraisal," *China Quarterly*, No. 54, Apr-Jun 1973, pp. 313-314; and Thomas George Rawski, *The Economics of Chinese Machine Building, 1931-1967* (Doctoral Thesis), Harvard University, 1972.

² State Statistical Bureau, *Kung-yeh ch'an-p'in mu-lu (Index of Industrial Commodities)*, Peking, 1953, pp. 41-85. The major categories and subcategories of the code dealing with machinery and equipment are listed in Appendix B.

Table 1

Guide to the Grouping of Estimates, by Category

Category	Specific Products	Table Number	Page Number
Power and electrical equipment (I and II)	Summary table	3	4
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Machine tools (III and IV).....	Machine tools	4	8
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	Clocks	9	19
	Watches	9	19

¹ See Appendix A.

Table 2

List of Principal Source References

Abbreviation	Reference
BBC.....	British Broadcasting Corporation, Summary of World Broadcasts, Part 3, the Far East, Weekly Economic Report, Reading, England.
CB.....	Current Background, Hong Kong, US Consulate General.
CCTP.....	Ching-chi tao-pao (Economic Bulletin), Hong Kong.
CCYC.....	Ching-chi yen-chiu (Economic Research), Peking.
CHCC.....	Chi-hua ching-chi (Planned Economy), Peking.
CHKY.....	Chi-hsieh kung-yeh (Machine Industry), Peking.
CHKYCP.....	Chi-hsieh kung-yeh chou-pao (Machine Industry Weekly), Shanghai.
CKHW.....	Chung-kuo hsin-wen (China News Service), Canton.
CKCKY.....	Chung-kuo ch'ing-kung-yeh (Chinese Light Industry), Peking.
Communique.....	Kuan-yu fa-chan kuo-min ching-chi ti ti-i-ko wu nien (1953 nien tao 1957 nien) chi-hua chih-hang chieh-kuo ti kung pao (Communique on the Fulfillment of the First Five-Year Plan—1953–1957—for the Development of the National Economy), State Statistical Bureau, Peking, 1959.
CP.....	China Pictorial, Peking.
CR.....	China Reconstructs, Peking.
ECMM.....	Extracts from China Mainland Magazines, Hong Kong, US Consulate General.
FBIS.....	Foreign Broadcast Information Service, Washington, DC.
HC.....	Hung-ch'i (Red Flag), Peking.
JMJP.....	Jen-min jih-pao (People's Daily), Peking.
JPRS.....	Joint Publications Research Service, Washington, DC.
KJJP.....	Kung-jen jih-pao (Daily Worker), Peking.
NCNA.....	New China News Agency, Peking and other cities.
Past and Present.....	Wo-kuo kang-t'ieh tien-li mei-t'an chi-hsieh fang-chih tsao-chih kung-yeh ti chin-hsi (Chinese Iron and Steel, Electric Power, Coal, Machinery, Textile, and Paper Industries—Past and Present), State Statistical Bureau, Peking, 1958.
PC.....	People's China, Peking.
PR.....	Peking Review, Peking.
SCMM.....	Selections from China Mainland Magazines, Hong Kong, US Consulate General.
SCMP.....	Survey of China Mainland Press, Hong Kong, US Consulate General.
TCKT.....	Tung-chi kung-tso (Statistical Work), Peking.
TGY.....	Ten Great Years, State Statistical Bureau, Foreign Languages Press, Peking, 1960.
TKP.....	Ta kung pao (Impartial Daily), Peking and Hong Kong.

Table 3

Production of Power and Electrical Equipment

Year	Steam Boilers (Metric Tons of Steam per Hour)	Hydro- turbines (Kilowatts)	Power Machinery (Thousand Horsepower)	Electric Generators (Kilowatts)	Electric Motors (Thousand Kilowatts)	Transformers (Thousand Kilovolt- Amperes)
1949.....	255	....	10	10,181	61.0	71.64
1950.....	585	....	11	22,798	199.0	....
1951.....	956	....	26	31,731	225.0	....
1952.....	1,222	6,664	35	29,678	638.7	1,167.08
1953.....	2,774	17,260	144	(59,525)	918.0	1,961
1954.....	2,885	10,000	172	54,617	957.0	1,961
1955.....	2,059	33,360	247	107,595	606.9	1,926
1956.....	3,022	102,749	657	288,263	1,069.0	2,891.07
1957.....	....	74,903	690	312,200	1,445.0	3,590
1958.....	....	....	2,000	1,425,000	6,052.0	12,000
1964.....	....	....	....	625,000	....	....
1965.....	....	....	....	780,000	....	....
1972.....	....	....	....	3,500,000	....	....

Notes and sources:

Steam boilers and hydroturbines: see Table 3-a.

Power machinery: see Table 3-b.

Electric generators, electric motors, and transformers: see Table 3-c.

Table 3-a

Production of Steam Boilers and Hydroturbines

	Steam Boilers		Hydroturbines	
	Units	Metric Tons of Steam per Hour	Units	Kilowatts
1949.....	209	255	....	....
1950.....	479	585	....	....
1951.....	782	956	....	....
1952.....	1,000	1,222	11	6,664
1953.....	....	2,774	....	17,260
1954.....	....	2,885	....	10,000
1955.....	1,274	2,059	....	33,360
1956.....	1,033	3,022	57	102,749
1957.....	....	....	....	74,903

Notes and sources:

Steam Boilers

Units

1949-52 *Past and Present*, p. 113.
 1955 *Ibid.*, p. 139.
 1956 *Ibid.*, p. 122.

Output per hour

1949-51 Calculated from the 1952 data as 1,222 tons per unit.
 1952 *Past and Present*, p. 122.
 1953 *CB*, No. 292, 15 Sep 1954, p. 3.
 1954 *Ibid.*, No. 360, 29 Sep 1955, p. 3.
 1955 *Past and Present*, p. 139.
 1956 *Ibid.*, p. 122.

Hydroturbines

Units and kilowatts

1952, 1956 *Past and Present*, p. 122.

Kilowatts

1953 *CB*, No. 292, 15 Sep 1954, p. 3.
 1954 *Osnovnye pokazateli razvitiye narodnoy khozyaystva kitayskoy narodnoy respubliky (Principal Indexes of the Development of the National Economy of the Peoples Republic of China)*, State Statistical Publishers, Moscow, 1958, pp. 38-39. This is a Russian translation of a report published by the Chinese State Statistical Bureau.
 1955 *CB*, No. 474, 12 Aug 1957, p. 3.
 1957 *Tien-chi kung-yeh (Electrical Industry)*, No. 10, 1957, p. 6.

Table 3-b

Production of Power Machinery

Thousand Horsepower

Internal Combustion Engines

	Total	Steam Engines	Total	Diesel	Other
1949.....	10	(6)	4	....	....
1950.....	11	....	....	....	....
1951.....	26	....	....	....	....
1952.....	35	7.458	27.621	17.995	(9.626)
1953.....	144	....	....	....	....
1954.....	172	....	....	....	....
1955.....	247	....	....	....	....
1956.....	657	(116.239)	540.761	371.700	(169.061)
1957.....	690	(81.000)	609.000	....	....
1958.....	2,000	....	....	....	....

Notes and sources:

Total power machinery

1949-58

TGY, p. 97.

Steam engines

1952

Past and Present, p. 142.

Total internal combustion engines

1949

Chu-yuan Cheng, *op. cit.*, p. 253.

1952

Past and Present, p. 123.

1956

Ibid.

1957

Communique, p. 7.

Diesel engines

1952

Past and Present, p. 114.

1956

ECMM, No. 105, 28 Oct 1957, p. 25.

Table 3-c

Production of Electric Generators, Electric Motors, and Transformers

	Electric Generators		Electric Motors	Transformers
	Units	Kilowatts	(Thousand Kilowatts)	(Thousand Kilovolt-Amperes)
1949.....	....	10,181	61.0	71.64
1950.....	....	22,798	199.0	....
1951.....	....	31,731	225.0	....
1952.....	746	29,678	638.7	1,167.08
1953.....	....	(59,525)	918.0	1,961
1954.....	....	54,617	957.0	1,961
1955.....	2,517	107,595	606.9	1,926
1956.....	6,883	288,263	1,069.0	2,891.07
1957.....	....	312,200	1,445.0	3,590
1958.....	....	1,425,000	6,052.0	12,000
1964.....	....	625,000	....	....
1965.....	....	780,000	....	....
1972.....	....	3,500,000	....	....

Notes and sources:

Electric generators

Units

1952 *Past and Present*, p. 113.1955 *Ibid.*, p. 139.1956 *Ibid.*, p. 113.

Kilowatts

1949-52 *Ibid.*, p. 113.

1953 *Ibid.*, p. 74, states that total output in 1953-56 was 510,000 kilowatts. Total output in 1954-56, according to the sources cited below, was 450,475 kw. Hence, 1953 output = 510,000 - 450,475 = 59,525 kw.

1954 *CB*, No. 391, p. 2.1955 *Past and Present*, p. 139.1956 *Ibid.*, p. 123.1957 *TCKT*, No. 10, 1957, p. 6.1958 *PR*, 15 Sep 1959, p. 22.

1964-65 The Chinese told visitors that output in 1972 was about 4.5 times that of 1965 which was 25% greater than in 1964. If output in 1972 was 3,500,000 kw (see below), output in 1965 was about 780,000 kw and in 1964 was about 625,000 kw.

1972 Output in 1972 was 528,000 kw at the Peking Heavy Electrical Machinery Plant and 1 million kw at the Shanghai Electrical Machinery Plant (*Report, Canadian Electrical Power Mission to the Peoples Republic of China*, The Runge Press, Ltd., Ottawa, 1974). In estimating a total of about 3,500,000 kw for the year, it was assumed that the electrical plants at Te-yang and Harbin produced about the same levels of output as the Peking and Shanghai plants, respectively, and that smaller plants elsewhere in China produced a total of about 500,000 kw.

Electric motors

1949-58 *TGY*, p. 97.

Transformers

1949 *Tien-chi kung-yeh (Electrical Industry)*, No. 10, 1957, p. 6.1952, 1955-56 *Past and Present*, pp. 114, 123, 139.1953 *CB*, No. 292, p. 3.1954 *CB*, No. 360, p. 3.1957 *CHKY*, No. 3, 1958, p. 3.1958 *TCKT*, No. 19, 1959, pp. 14-19.

Table 4

Production of Machine Tools

	Thousand Units	Metric Tons		Thousand Units	Metric Tons
1949.....	1.582	....	1962.....	25	....
1950.....	3.312	....	1963.....	35	....
1951.....	5.853	....	1964.....	40	....
1952.....	13.734	16,298	1965.....	45	....
1953.....	20.502	24,039	1966.....	50	....
1954.....	15.901	23,530	1967.....	40	....
1955.....	13.708	....	1968.....	45	....
1956.....	25.928	....	1969.....	55	....
1957.....	28.297	....	1970.....	70	....
1958.....	30	....	1971.....	75	....
1959.....	35	....	1972.....	75	....
1960.....	40	....	1973.....	80	....
1961.....	30	....		

Notes and sources:

Units

1949-56 *TGY*, p. 97.

1957 *PR*, 2 Sep 1958, p. 12.

1958-73 Official sources reported output of 50,000 units in 1958 (*TGY*, p. 97), 70,000 in 1959 (*PR*, 5 Apr 1960, p. 16), and a planned figure of 90,000 for 1960 (*Ibid.*, p. 12). These Leap Forward figures are obviously crude estimates and have been heavily deflated to exclude the huge volume of primitive machinery thrown together by unskilled labor in communes and small, poorly equipped shops during this period. Only about half of the reported output is believed to have been comparable in quality, durability, and utility to the 28,297 units reported for 1957. Estimates for 1958 and thereafter were derived from fragmentary reports on output trends and capacity additions at some 30 major machine tool plants. These estimates, for the most part, should be considered as minimum totals; in any given year, literally hundreds of small and medium-size machinery plants may have been assigned the tasks of producing a small assortment of standardized lathes, drilling machines, etc.

Metric tons

1952-54 *CB*, No. 429, 26 Nov 1956, p. 7.

Table 5

Production of Textile Machinery

Thousand Units

	Looms	Spindles	Sewing Machines		Looms	Spindles	Sewing Machines
1951.....	4.217	131.984	....	1960.....	....	....	676
1952.....	6.468	383.128	....			
1953.....	9.653	287.424	257	1964.....	....	700	1,257
1954.....	15.120	489.044	316	1965.....	....	1,400	1,571
1955.....	9.291	304.400	174	1969.....	....	....	1,800
1956.....	19.251	784.020	206	1970.....	....	....	2,400
1957.....	(12.300)	484	278	1971.....	....	....	3,000
1958.....	13.700	1,000	637	1972.....	....	....	3,300
1959.....	21.900	1,360	(563)	1973.....	....	....	3,894

Notes and sources:

Looms

- 1951-56 *Past and Present*, p. 161.
 1958-59 *CB*, No. 618, p. 19.
 1957 Total output through 1958 was 90,000 units (*NCNA*, Peking, 18 Sep 1959); through 1956 it was 64,000 units (*Past and Present*, p. 161). Hence, output in 1957 = 90,000 - 64,000 - 13,700 (1958 output) = 12,300.

Spindles

- 1951-56 *Past and Present*, p. 161.
 1957-58 *CB*, No. 558, 20 Apr 1959, p. 3.
 1959 *CKHW*, 11 Apr 1960, p. 12.
 1964-65 Output of 1,400,000 units in 1965 was double output in 1964 (*NCNA*, 17 and 18 Dec 1965).

Sewing machines

- 1953-55 *CKCKY*, No. 16, 1957, p. 13.
 1956-58 *Ibid.*, No. 5, 1959, pp. 3-4 (*JPRS*, No. 981-1, 23 Oct 1959).
 1959 According to *JMJP*, 7 Apr 1960 (*FBIS*, 11 Apr 1960, p. BB23), total output in 1958-59 was 1,200,000 units. Hence, output in 1959 = 1,200,000 - 637,000 = 563,000.
 1960 According to *HC*, No. 6, 16 Feb 1961 (*SCMM*, No. 256, p. 21), output increased by more than 20%.
 1969-71 A visiting foreigner was told that actual output totaled 1,800,000 units in 1969 and that the 1971 plan called for 3 million units. Interpolation between these figures gives an estimate of 2,400,000 units for 1970.
 1972 An increase of 10% was assumed.
 1965 According to *NCNA*, Peking, 5 Oct 1973 (*FBIS*, 24 Oct 1973, p. B13), output in 1972 was 2.1 times the figure for 1965. Hence, 1965 output = 3,300,000 / 2.1 = 1,571,000 units.
 1964 Output increased by 30% in the first quarter (*TKP*, Peking, 3 May 1965, p. 2) and by 20% to 47% in the first eight months (*FBIS*, 15 Oct 1965, p. ccc2). On this basis, an annual increase of 25% was assumed. 1964 output = 1965 output / 1.25 = 1,257,000 units.
 1973 According to *NCNA*, Peking, 5 Oct 1973 (*FBIS*, 24 Oct 1973, p. B13), output in the first eight months increased by 18.6%. An annual increase of 18% was assumed.

Table 6

Production of Agricultural Equipment and Tractors

	Agricultural Machinery (Units)	Powered Irrigation Equipment (Thousand Horsepower)	Standard Tractors (Thousand 15-Horsepower Units)	Garden Tractors (15-Horse- power Units)
1949.....
1950.....
1951.....
1952.....	50,063	....	....	....
1953.....	100,664	....	....	....
1954.....	176,503	....	....	....
1955.....	736,935	....	....	....
1956.....	2,174,193	170	....	....
1957.....	(52)	....	....
1958.....	720	1.1	....
1959.....	1,255	9.4	....
1960.....	1,610	23.8	....
1961.....	700	(16.2)	....
1962.....	955	13.1	....
1963.....	640	15.7	....
1964.....	(860)	19.3	150
1965.....	1,150	23	875
1966.....	1,530	32	2,625
1967.....	27	2,100
1968.....	30	2,675
1969.....	40	3,200
1970.....	70	9,000
1971.....	3,089	105	9,625
1972.....	4,016	115	21,000
1973.....	5,984	138	28,000

Notes and sources:

Agricultural machinery: see Table 6-a.

Powered irrigation equipment: see Table 6-b.

Standard tractors: see Table 6-c.

Garden tractors: see Table 6-d.

Table 6-a

Production of Agricultural Machinery

	Total	Plows	Seeders	Cultivators	Harvesters
1952.....	50,063	5,060	344	44,441	218
1953.....	100,664	3,007	4,590	92,533	534
1954.....	176,503	59,582	12,469	98,780	5,672
1955.....	736,935	522,697	24,533	179,502	10,203
1956.....	2,174,193	1,793,186	76,683	300,527	3,797

Notes and sources:

1952-56: *KJJP*, 21 Sep 1957.

Table 6-b

Powered Irrigation Equipment				Thousand Horsepower	
	Inventory	Production		Inventory	Production
1949.....	97	....	1962.....	5,800	955
			1963.....	6,440	640
1951.....	118	....	1964.....	7,300	(860)
			1965.....	8,450	1,150
1955.....	(338)	....	1966.....	9,980	1,530
1956.....	508	170			
1957.....	560	(52)	1970.....	16,911	....
1958.....	1,280	720	1971.....	20,000	3,089
1959.....	2,535	1,255	1972.....	24,016	4,016
1960.....	4,145	1,610	1973.....	30,000	5,984
1961.....	4,845	700			

Notes and sources:

Where data on both inventory and production were not available, it was assumed that production in the current year was the difference between inventory in the current year and inventory in the previous year.

1949 inventory: *TKP*, Peking, 19 Dec 1957, p. 1.

1951 inventory: *PC*, 1 Oct 1952, p. 28.

1956 inventory and production: 390,000 horsepower of equipment was manufactured in 1952-56 (*ECMM*, No. 127, 5 May 1958, p. 48); hence, inventory in 1956 = 390,000 + 118,000 = 508,000.

From 1 Oct 1955 to 30 Sep 1956, 170,000 horsepower were added (*ECMM*, No. 99, p. 1).

1955 inventory: 508,000 - 170,000 = 338,000.

1957 inventory and production: Inventory (*JMJP*, 14 Jan 1961); hence, 1957 production = 560,000 - 508,000 = 52,000.

1958-63 inventory and production: Figures for production in these years were reduced to account for discrepancies between official data reported from year to year and total capacity reported for 1957 and 1962. Yearly production and inventory figures indicate an addition of 7,480,000 horsepower during the period, whereas a later figure indicates that the inventory rose by 5,240,000 horsepower. Thus production figures derived from official data were reduced by 30%. The differences in official figures probably are due mainly to the manufacture of unusable equipment during the Leap Forward (1958-60). Derivation of the unadjusted and adjusted series is shown below (in thousand horsepower):

	Unadjusted Series		Adjusted Series	
	Inventory	Production	Inventory	Production
1957.....	560	52	560	52
1958.....	1,590 ¹	1,030 ²	1,280	720
1959.....	3,380 ³	1,790 ⁴	2,535	1,255
1960.....	5,680 ⁵	2,300 ⁶	4,145	1,610
1961.....	6,680 ⁷	1,000 ⁶	4,845	700
1962.....	5,800 ⁸	1,360 ⁹	5,800	955
1963.....	6,440 ¹⁰	640 ⁹	6,440	640

¹ 560 + 1,030.

² 3,380 - 560 - 1,790 = 1,030.

³ *CB*, No. 618, 17 May 1960.

⁴ Planned output for 1960 was 2,500,000 horsepower, or 40% above actual output in 1959 (*CB*, No. 618, 17 May 1960). Hence, actual output in 1959 was 2,500,000/1.4 = 1,790,000.

⁵ 3,380 + 2,300 = 5,680.

⁶ *NCNA*, Peking, 26 Sep 1962. The total figure for 1960-61 (3,300) is verified in *JPRS*, No. 13,828, 28 May 1962, p. 48.

⁷ 5,680 + 1,000 = 6,680.

⁸ *PR*, 28 Jun 1963, p. 20.

⁹ Some 3,000,000 horsepower in equipment was added in 1961-63 (*CKIHW*, 14 Aug 1964, p. 9) and 640,000 in 1963 (*FBIS*, 3 Jan 1964, p. ccc11). Hence, 1962 output = 3,000,000 - 640,000 = 1,360,000.

¹⁰ 5,800 + 640 = 6,440.

1964 inventory and production: The inventory increased by 12 times over 1957 (*CR*, Mar 1965, p. 3)— $13 \times 560,000 = 7,300,000$. Output in 1964 = $7,300,000 - 6,440,000 = 860,000$.

1965 inventory and production: Output was one-third higher than in 1964 (*Far East Trade and Development*, May 1967, p. 461)— $1.333 \times 860,000 = 1,150,000$. Inventory = $7,300,000 + 1,150,000 = 8,450,000$.

1966 inventory and production: Supplies were one-third higher than in 1965 (*FBIS*, 9 Jan 1967 p. ccc4)— $1.333 \times 1,150,000 = 1,530,000$. Inventory = $8,450,000 + 1,530,000 = 9,980,000$.

1970-73 inventory and production: 1971 inventory (*FBIS*, 23 Oct 1974, p. E1); 1973 inventory (*NCNA*, Peking, 16 Sep 1974). Output in the first eight months of 1972 was 30% higher than in the same period in 1971 (*NCNA*, Peking, 5 Oct 1972) and 49% higher in the first eight months of 1973 compared with the same period in 1972 (*FBIS*, 5 Oct 1973, p. B2). On the assumption that these rates of increase were maintained throughout the year, inventory and output were derived as follows:

Let I_{73} and I_{71} represent inventories at the end of 1973 and 1971, respectively, and Q_{71} , Q_{72} , and Q_{73} stand for production in 1971, 1972, and 1973. Then, in thousands of horsepower,

$$I_{73} - I_{71} = Q_{72} + Q_{73}.$$

Solving this equation yields

$$30,000 - 20,000 = 1.30Q_{71} + 1.49Q_{72}$$

$$10,000 = 2.49 \times 1.30Q_{71}$$

$$Q_{71} = 3,089$$

$$Q_{72} = 4,016$$

$$Q_{73} = 5,984$$

$$I_{70} = 16,911$$

$$I_{72} = 24,016.$$

Standard Tractors

Thousand 15-Horsepower Units

Inventory		Production	Inventory		Production
1949.....	0.401	....	1962.....	103	13.1
1950.....	1.286	....	1963.....	115	15.7
1951.....	1.410	....	1964.....	123	19.3
1952.....	2.006	....	1965.....	....	23
1953.....	2.719	....	1966.....	150	32
1954.....	5.061	....	1967.....	....	27
1955.....	8.094	....	1968.....	....	30
1956.....	19.367	....	1969.....	....	40
1957.....	24.629	....	1970.....	272	70
1958.....	45.330	1.1	1971.....	....	105
1959.....	59	9.4	1972.....	354	115
1960.....	79	23.8	1973.....	....	138
1961.....	....	(16.2)			

Notes and sources:

Production

Production of tractors began in 1958. Standard units measure each type of tractor in terms of horsepower rather than physical units and thus provide an adjustment for differences in size, weight, complexity, and cost. China follows the practice of other Communist countries and converts each tractor to standard units of 15 drawbar horsepower. The drawbar horsepower of Chinese tractors ranges from 50% to 70% of the more commonly used brake horsepower. For most years, the tractor produced in the greatest volume probably has been a 54 brake horsepower model that develops 36 horsepower at the drawbar. One physical unit is equivalent to 36.15 = 2.1 standard 15-horsepower units.

1958: Production was 957 physical units (*TGY*, p. 98). A perusal of reports discussing tractor models produced in 1958 suggests that an average tractor was the equivalent of about 1.2 standard 15-horsepower units. Thus, 957 x 1.2 = 1,100 standard units. This estimate is consistent with a report that annual average output in 1960-61 20,000 standard units was about 20 times that of 1958 (*SCMM*, No. 315, 28 May 1962, p. 21).

1959: *Ekonomika sotsialisticheskikh stran v tsifrakh 1962*, *Kratkiy Statisticheskiy Sbornik*, Moscow, 1963, p. 32.

1960: *Chung-kuo ch'ing-nien pao* (*China Youth Daily*), 12 Mar 1961.

1961: Output of 40,000 standard units was reported as the total for the two years 1960-61 (*SCMM*, No. 315, 28 May 1962, p. 21). Output in 1961 = 40,000 - 23,800 = 16,200 units.

1962-63: Output of 45,000 standard units was reported as the total for the three years 1961-63 (*CKIHW*, Canton, 14 Aug 1964, p. 42). Output in 1962-63 = 45,000 - 16,200 = 28,800 units. Output in 1963 was about 20% above that in 1962 (*PR*, 3 Jan 1964, p. 42). Algebraically,

$$\begin{aligned} Q_{62} + Q_{63} &= 28,800 \\ Q_{63} &= 1.2Q_{62} \end{aligned}$$

Solving these equations yields

$$\begin{aligned} Q_{62} &= 13,100 \\ Q_{63} &= 15,700. \end{aligned}$$

1964: Output in the first eight months was about 23% above that in the corresponding period of 1963 (*PR*, 11 Dec 1964, pp. 26-27). This rate of increase was assumed for the entire year.

1965-70: Rough estimates based on fragmentary information on output at the Lo-yang and other major tractor plants.

1971: Derived from the 1972 figure on the basis of a report that output in 1972 was 10% above that of 1971 (*FBIS*, 15 May 1973, p. B3).

1972: Output in 1972 was five times that of 1965. (*Economic Reporter*, English supplement, Hong Kong, No. 4, Oct-Dec 1973, p. 23).

1973: Output was six times that of 1965. (*CR*, Jan 1965, p. 6).

Inventory

These figures refer to tractors for use in agriculture.

1949-58: *TGY*, p. 135.

1959: *PR*, 1 Mar 1960, p. 6.

1960: *PR*, 20 Jan 1961, p. 4.

1962: *PR*, 10 May 1963, p. 13.

1963: *PR*, 11 Dec 1964, pp. 26-27.

1964: *PR*, 1 Jan 1965, p. 8.

1966: Soviet source citing official Chinese figures (*FBIS*, Vol. III, 8 Nov 1974, p. C4).

1970: *PR*, 22 Oct 1971, pp. 5-7.

1972: Cheng Shih, *A Glance at China's Economy*, Peking, Foreign Languages Press, 1974, p. 18.

Table 6-d

Garden Tractors

Thousand Units

	Inventory		Production	
	Physical Units	15-Horsepower Units	Physical Units	15-Horsepower Units
1964.....	0.6	0.150	0.6	0.150
1965.....	4.1	1.025	3.5	0.875
1966.....	14.6	3.650	10.5	2.625
1967.....	23.0	5.750	8.4	2.100
1968.....	33.7	8.425	10.7	2.675
1969.....	46.5	11.625	12.8	3.200
1970.....	82.5	20.625	36.0	9.000
1971.....	121.0	30.250	38.5	9.625
1972.....	205.0	51.250	84.0	21.000
1973.....	317.0	79.250	112.0	28.000

Notes and sources:

Production of garden tractors was negligible prior to 1964. The garden tractor produced in the greatest volume probably has been a model with a brake horsepower of 7. Assuming a drawbar horsepower of 4, one physical unit is equivalent to about one-fourth of a standard 15-horsepower unit. Figures in the table were derived by first estimating output in physical units and then dividing these estimates by 4 to obtain output in standard 15-horsepower units.

With the exceptions noted below, the estimates were based on fragmentary reports of output trends at numerous, widely scattered, small-scale tractor plants. Inventory estimates were made by adding production in the current year to inventory in the previous year, with no allowance made for depreciation.

Production

1966: Output in the first nine months was up by 200% over that of the corresponding period in 1965 (*SCMP*, No. 3807, 25 Oct 1966, p. 14). This rate of increase was assumed for the entire year.

1970: Output in the first seven months was almost twice as high as that for all of 1966 (*CR*, Dec 1970, p. 20). Output in the first seven months was 21,000 and for the entire year was estimated as $21,000 \times 12/7 = 36,000$.

1972: Output was 24 times that of 1965 (Cheng Shih, *A Glance at China's Economy*, Peking, Foreign Languages Press, 1974, p. 23).

1973: Output was 32 times that of 1965 (*CR*, Jan 1975, p. 6).

Inventory

1972: Inventory in 1972 was more than 50 times that of 1965 (Cheng Shih, *op. cit.*, p. 18)— $50 \times 4,100 = 205,000$. This estimate of inventory served as a control total in estimating output for the years not specifically listed above.

Table 7

Production of Transportation Equipment

	Mainline Locomotives (Units)	Freight Cars (Thousand Units)	Merchant Vessels (Thousand Tons of Light Ship Displacement)	Motor Vehicles (Thousand Units)
1949.....	....	3.155	....	....
1950.....	....	0.696	....	....
1951.....	....	2.882	....	....
1952.....	20	5.792	6.1	....
1953.....	10	4.501	14.8	....
1954.....	52	5.446	31.4	....
1955.....	98	9.258	50.2	....
1956.....	184	7.122	51.2	1.654
1957.....	167	7.3	46.4	7.5
1958.....	350	11.0	56.6	16.0
1959.....	533	17.0	64.5	19.4
1960.....	602	23.0	41.4	15.0
1961.....	100	3.0	28.2	1.0
1962.....	25	4.0	23.1	8.4
1963.....	27	5.9	25.8	16.8
1964.....	27	5.7	34.2	20.3
1965.....	50	6.6	29.1	30
1966.....	140	7.5	19.8	43
1967.....	200	6.9	22.5	32
1968.....	240	8.7	48.0	27
1969.....	261	11	108.9	60
1970.....	285	12	193.2	70
1971.....	205	14	231.9	86
1972.....	225	15	163.5	100
1973.....	240	16	161.7	110

Notes and sources:

Locomotives and freight cars: see Table 7-a.

Merchant vessels: see Appendix A.

Motor vehicles: see Table 7-b.

Table 7-a

Production of Mainline Locomotives and Freight Cars

Units

	Mainline Locomotives				Freight Cars
	Total	Steam	Diesel	Electric	
1949.....	....	....	....	....	3,155
1950.....	....	....	....	....	696
1951.....	....	....	....	....	2,882
1952.....	20	20	....	....	5,792
1953.....	10	10	....	....	4,501
1954.....	52	52	....	....	5,446
1955.....	98	98	....	....	9,258
1956.....	184	184	....	....	7,122
1957.....	167	167	....	....	7,300
1958.....	350	346	2	2	11,000
1959.....	533	530	3	....	17,000
1960.....	602	600	....	2	23,000
1961.....	100	100	....	....	3,000
1962.....	25	25	....	....	4,000
1963.....	27	25	....	2	5,900
1964.....	27	25	2	....	5,700
1965.....	50	20	30	....	6,600
1966.....	140	70	70	....	7,500
1967.....	200	100	100	....	6,900
1968.....	240	100	140	....	8,700
1969.....	261	100	160	1	11,000
1970.....	285	100	180	5	12,000
1971.....	205	....	200	5	14,000
1972.....	225	....	220	5	15,000
1973.....	240	....	240	....	16,000

Notes and sources:

Mainline locomotives

1952-58: *TGY*, p. 98.1959: Planned output in 1960 was 800 units, an increase of more than 50% over that of 1959 (*PR*, 5 Apr 1960, p. 12)—hence, 1959 output was $800/1.5 = 533$ units.

1960-73: Estimated from fragmentary reports on production trends at major manufacturing facilities in Chu-chou, Dairen, Ta-t'ung, and Tsingtao.

Freight cars

1949-52: *Past and Present*, p. 113.1953: *CB*, No. 360, 29 Sep 1955, p. 3.1954-55: *PC*, No. 14, 16 Jul 1956, supplement, p. 4.1956: *Past and Present*, p. 123.1957-58: *CB*, No. 556, 1959, p. 5, and *Communique*, p. 17.1959: *Kung-lu* (Highways), Peking, 5 Dec 1959.

1960-73: Estimated from fragmentary reports on production trends at major manufacturing facilities in Ch'i-ch'i-ha-erh, Chu-chou, Dairen, and Wu-ch'ang.

Table 7-b

Production of Motor Vehicles

Thousand Units

	Total	Ch'ang-ch'un	Other		Total	Ch'ang-ch'un	Other
1956.....	1.651	1.654	....	1965.....	30	27.5	2.5
1957.....	7.5	7.5	....	1966.....	43	37.4	5.6
1958.....	16.0	16.0	....	1967.....	32	28	4
1959.....	19.4	19.4	....	1968.....	27	24	3
1960.....	15.0	15.0	....	1969.....	60	42	18
1961.....	1.0	1.0	....	1970.....	70	50	20
1962.....	8.4	7.3	1.1	1971.....	86	60	26
1963.....	16.8	(16.2)	0.6	1972.....	100	47	53
1964.....	20.3	19.5	0.8	1973.....	110	50	60

Notes and sources:

For all practical purposes, the Ch'ang-ch'un Motor Vehicle Plant was the only producer during 1956-61.

1956-58: *TGY*, p. 98.

1959: *JMJP*, 25 Jan 1960.

1960-61: Arbitrary estimates based on reports that Ch'ang-ch'un was extensively reorganized (*JMJP*, 22 May 1960), with assembly operations apparently reduced in order to expand production of spare parts (*Ibid.*, 17 May 1961) and gasoline engines for mining locomotives (Radio Peking, 3 Oct 1960).

1962-64: As of Sep 1961, total output was running at an annual rate that was 2.7 times that of 1957; 1961 output, hence, was $2.7 \times 7,500 = 20,300$ (*SCMP*, No. 3306, 28 Sep 1961, p. 16). Total output in 1961 rose by more than 20% over that of 1963; $20,300/1.21 = 16,800$ (*Ibid.*, No. 3391, 5 Feb 1965, p. 1). Total output in the first eight months of 1963 was double that of the same period in 1962; assuming this rate was maintained, 1962 output must have been around $16,800/2 = 8,400$ (*CHKY*, 10 Oct 1963, p. 3). At Ch'ang-ch'un, output in 1964 was the highest ever—a minimum of 19,500 is assumed (*NCNA*, Peking, 30 May 1965). Output in 1963 at the Shanghai Truck Plant was about 600 units; so output at Ch'ang-ch'un was $16,800 - 600 = 16,200$ units (*La Citta Futura*, Rome, No. 12-13, Jul-Aug 1965, pp. 14-16). Output at Ch'ang-ch'un in the first nine months of 1963 increased by 123% over the same period in 1962; assuming that rate was maintained, output in 1962 was $16,200/2.23 = 7,300$ (*Wen-hui pao*, Hong Kong, 4 Oct 1963, p. 2).

1965-66: Output at Ch'ang-ch'un in 1965 rose by 40.8% over that of 1964; $1.41 \times 19,500 = 27,500$ (*CKHW*, 12 Apr 1966, p. 1). Total output is estimated to have risen to at least 30,000. Output at Ch'ang-ch'un in the first 11 months of 1966 was 36.3% higher than in all of 1965; assuming 36% for the year, $1.36 \times 27,500 = 37,400$ (*SCMP*, No. 3839, 13 Dec 1966, p. 21). Production at other plants in Shanghai, Nanking, Tientsin, and Tsinan is estimated at 5,600; hence total output was about 43,000 units.

1967-68: Figures are rough estimates based on fragmentary reports of work stoppages in Ch'ang-ch'un and elsewhere (see, e.g., *FBIS*, 15 May 1967, p. ddd22).

1969-73: A visiting foreign industrial group was told that total output in 1969 was 55,000 to 65,000 units (*American Machinist*, 27 Dec 1971, p. 21). Output at Ch'ang-ch'un in 1970 surpassed the plant's designed capacity by 67% (*PR*, 13 Aug 1971, p. 30); since the original capacity was 30,000 units, output in 1970 was $30,000 \times 1.67 = 50,000$. Output at Ch'ang-ch'un increased by 20% in 1971 (*JPRS*, No. 58070, 26 Jan 1973, p. 1); $50,000 \times 1.2 = 60,000$. Output at Ch'ang-ch'un in 1972 was 69.8% higher than in 1965 (*FBIS*, 27 Jul 1973, p. G2); $1.7 \times 27,500 = 47,000$. Output at Ch'ang-ch'un in the first six months of 1973 was 7.8% above that in the same period in 1972 (*Ibid.*); assuming 7% for the year, $1.07 \times 47,000 = 50,000$. Total output is estimated to have grown much faster than output at Ch'ang-ch'un during this period because of the proliferation of small-scale plants engaging in batch production of motor vehicles. By 1970 the Chinese reported that "cars and trucks are not only produced in large modern plants but over 20 provinces, cities, and autonomous regions have plants of their own turning out mostly trucks for local use under local conditions" (*CR*, Oct 1970, pp. 32-34).

Table 8

Production of Telecommunications Equipment

Thousand Units

	Radio Sets	Television Sets		Radio Sets	Television Sets
1953.....	25	....	1964.....	1,000	5
1954.....	28.5	....	1965.....	1,000	5
1955.....	123	....	1966.....	1,000	8
1956.....	(220)	....	1967.....	1,000	5
1957.....	390	....	1968.....	1,000	5
1958.....	1,200	....	1969.....	1,000	10
1959.....	1,560	....	1970.....	3,800	15
1960.....	1,500	....	1971.....	4,000	20
1961.....	1,250	2	1972.....	4,480	40
1962.....	1,000	3	1973.....	8,060	75
1963.....	1,000	3			

Notes and sources:

Radio sets

1953, 1957, 1960: Output in 1960 "was over 60 times more than in 1953" (*SCMP*, No. 2439, 17 Feb 1961, p. 10-11) and in 1957 and 1960 it amounted to 390,000 and 1,500,000 sets, respectively (*NCNA*, Peking, 8 Nov 1961); hence, output in 1953 was $1,500,000/60 = 25,000$ sets.

1954: *KJJP*, 16 Jun 1958.

1955-56: Output in 1957 was 170,000 sets greater than in 1956 (*SCMP*, No. 1684, 6 Jan 1958, p. 5)— $390,000 - 170,000 = 220,000$ sets in 1956. Output in 1956 was 79% greater than in 1955 (*Radio Peking*, 9 Mar 1957)— $220,000/1.79 = 123,000$.

1958: *NCNA*, 9 Nov 1959.

1959: According to *Wu-hsien-tien (Radio)*, No. 2, Feb 1960, at the end of 1959, output was four times that in the last stage of the First Five-Year Plan (assumed to refer to 1957).

1961-69: Estimated from fragmentary press reports on output trends in major radio plants.

1970: Sales of transistor radios increased by 280% compared with sales in 1969 (*BBC/SWB/FE/W604/A/13*, 13 Jan 1971); on the assumptions that sales equaled domestic production and that transistor radios made up 75% of production in 1965 and 95% in 1969-70:

	Total	Transistor Radios	Tube Radios
1965.....	1,000,000	750,000	250,000
1969.....	1,000,000	950,000	50,000
1970.....	3,800,000	3,600,000	200,000

1971: Output was four times that of 1965 (*FBIS*, 19 May 1972, p. B2).

1972: Output increased by 12% over 1971 (*FBIS*, 7 Aug 1973, p. B5).

1973: Assumes an 80% increase based on a report that output increased by 83.2% in the first five months (*FBIS*, 7 Aug 1974, p. B5).

Television sets

1961-71: Estimated from fragmentary reports on output trends in major television plants. China reportedly had 20,000 sets in use throughout the country in 1960 (*TKP*, Hong Kong, 4 Sep 1960) and 100,000 sets in use in 1971 (*South China Morning Post*, Hong Kong, 29 Nov 1972). Since China did not begin series production of television sets until 1961, the sum of the 20,000 sets (mostly imported) in 1960 and the accumulative production in 1961-71 should approximate 100,000 sets. The estimates do, in fact, sum to 101,000 sets.

1972-73: Output rose by 100% in 1972 and by 88.8% in the first few months of 1973 (*FBIS*, 7 Aug 1973, p. B5). The increase for 1973 is assumed to have been maintained throughout the year.

Table 9

Production of Consumer Products

Thousand Units

	Bicycles	Thermos Bottles	Clocks	Watches	
				Total	Shanghai
1949.....	14	....	....	....	....
1950.....	21	....	....	....	....
1951.....	44	....	....	....	....
1952.....	80	5,536	152	....	....
1953.....	165	12,007	306	....	....
1954.....	298	14,841	578	....	....
1955.....	335	17,958	812	....	....
1956.....	640	16,310	1,699	....	0.4
1957.....	806	20,870	2,040	....	....
1958.....	1,174	27,611	3,068	....	13.0
1959.....	1,479	37,000	5,700	....	74.0
1960.....	1,840	....	....	650	450.0
1961.....	634	....	....	....	545.0
1962.....	1,000	....	5,000	....	....
1963.....	1,101	33,216	....	....	....
1964.....	1,209	....	....	....	....
1965.....	1,792	....	....	1,200	840.0
1966.....	2,044	....	....	....	925.0
1968.....	2,412	....	....	....	....
1969.....	3,026	....	....	....	....
1970.....	3,640	....	....	....	....
1971.....	4,030	....	....	6,200	2,500.0
1972.....	4,300	....	....	6,950	2,500.0
1973.....	4,859	....	....	7,800	2,650.0

Notes and sources:

Bicycles

1949-58: *TGY*, p. 99.1959: An estimated 25% increase, the increase as estimated for Shanghai—262,000 units in 1958 and 330,000 in 1959 (*NCNA*, Peking, 3 Jan 1958 and 27 Dec 1960; *JPRS*, No. 4748, 30 Jun 1961).1960: Output increased 22-fold compared with that in 1952 (*Wen-hui pao*, Hong Kong, 21 Mar 1961, p. 1) and was more than 20% greater than in 1959 (*SCMM*, No. 256, p. 21).1961-62: Output in 1962 was estimated from data on five major plants (*SCMP*, No. 2827, 29 Sep 1962). Output in 1961 was estimated from a report that, in Shanghai, output in the first seven months of 1962 amounted to 92% of total output in 1961 (*NCNA*, Shanghai, 22 Dec 1962)— $7/12 \times 1/0.92 \times 1,000,000 = 634,000$.1963: Assumes that the 10.1% increase reported for the first six months (*FBIS*, 13 Jul 1963, pp. ccc8-ccc9) was maintained throughout the year.1964: Market supply was 50% greater than in 1957 (*FBIS*, 31 Dec 1964, p. ccc2).1965, 1971-72: Output in 1971 was five times that of 1957— $5 \times 806 = 4,030$ (*PR*, 13 Oct 1972, p. 11).Output in 1972 was 6.7% above that in 1971— $1.067 \times 4,030 = 4,300$ (*FBIS*, 19 Mar 1973, p. B5).Output in 1972 was 2.4 times that in 1965— $4,300/2.4 = 1,792$ (*FBIS*, 24 Oct 1973, p. B13).1966: An estimated 11% increase over 1960, the same increase as reported for Shanghai—495,000 units in 1960 and 550,000 in 1966 (*NCNA*, Peking, 27 Dec 1960 and *CKHW*, 21 Oct 1966, p. 10).1968: Assumes that the 18% increase in the first half of the year compared with the previous peak output for that period (1966) was maintained throughout the year (*FBIS*, 10 Jul 1968, p. B4).

1969: Interpolated between 1968 and 1970.

1970: Output was 260 times that in 1949 (*CR*, Feb 1972, p. 47).1973: Output in the first eight months was 13% above that in the same period of 1972 (*FBIS*, 24 Oct 1973, p. B13).

Thermos bottles

1952: *CKCKY*, No. 20, 1957, pp. 2-4.1953-55: *Ibid.*, No. 16, 1957, p. 13.1956-57: *Ibid.*, No. 5, 1959, p. 3.

1958-59: *SCMP*, No. 2192, 9 Feb 1960, p. 13, and *CB*, No. 618, 17 May 1960, p. 1.
1963: *SCMM*, No. 446, 7 Dec 1964, p. 35.

Clocks

1952: *CKCKY*, No. 20, 1957, pp. 2-4.
1953-56: Calculated from percentage figures in *CKCKY*, No. 16, 1957, p. 11.
1957-58: *JPRS*, No. 3243, 13 May 1960.
1959: *SCMP*, No. 2192, 9 Feb 1960.
1962: *Ibid.*, No. 2806, 24 Aug 1962.

Watches

Shanghai

The figures for Shanghai probably are for Shanghai Watch Plant No. 1. Total output from all watch manufacturing plants in the city was 3,040,000 units in 1973 (*FBIS*, 17 Oct 1974, p. G5).
1956: Trial production (*NCNA*, Shanghai, 21 Mar 1957)—mass production did not begin until 1958.
1958-60: *Chih-fang chih-pao*, Shanghai, 11 Dec 1961, p. 2.
1961: *Ibid.*, also gave an 11-month figure of 500,000 for 1961—this was extrapolated to 12 months.
1965: Derived from an estimated increase of 10% for 1966.
1966, 1972: Output in 1972 was 2.5 million, a 1.7-fold increase over 1966 (*TKP*, Hong Kong, 13 May 1973, p. 3); hence, output in 1966 = $2.5/2.7 = 0.925$ million.
1971: *CR*, Feb 1972, p. 48.
1973: *FBIS*, 23 Sep 1974, p. G3.

Total

1960: Planned production (*SCMP*, No. 2298, 15 Jul 1960).
1965: Derived by adding an estimated 850,000 for Shanghai as a whole, 153,500 for the Tientsin plant (Barry M. Richman, *A First Hand Study of Industrial Management in Communist China*, University of California, Los Angeles, 1967, p. 61), and at least 100,000 from a new plant in Nanking.
1971-72: Output in 1972 was 5.8 times that in 1965 (*FBIS*, 24 Oct 1973, p. B13)— $1,200 \times 5.8 = 6,950$ —and 12% above that in 1971— $6,950/1.12 = 6,200$.
1973: Assumes that the 12% increase in the first eight months was maintained throughout the year (*FBIS*, 24 Oct 1973).

APPENDIX A

Merchant Shipbuilding

The Chinese have released a good deal of information about their merchant shipbuilding industry, but most of it is fragmentary and restricted to announcements of the launchings of major new vessels. Virtually the sum total of official aggregative statistics on nonnaval shipbuilding is arrayed in Table A-1. In filling the gaps in Table A-1 and extending the time series through 1959-73, several simplifying assumptions and adjustments had to be made. The methodology is explained step by step in the footnotes to Tables A-2 through A-4 and is briefly summarized here.

The first step involved the choice of an appropriate unit of measurement. Tonnage in terms of light ship displacement (LSD) was selected because it is the best measure for use in estimating construction costs. LSD of a vessel is calculated by subtracting the deadweight (DWT) tonnage from the full load displacement (FLD) tonnage. LSD is, in short, the weight of the ship fully equipped and ready for sea but empty (or "light") of cargo, passengers, stores, fuel, or fresh water.* LSD for the missing years 1953-55 and 1957-58 was derived by extrapolation (see Table A-2).

*Examples of Chinese use of the units FLD, DWT, and LSD can be found in *Chung-kuo tsao-ch'uan* (*China Shipbuilding*), Shanghai, No. 4, 15 Oct 1959 (translated in *JPRS* 2850, 17 Jun 1960).

Table A-1

Official Statistics on the Production of Merchant Vessels
Tons

	FLD ¹	DWT ²	LSD ³
1952.....	21,485	16,000	(5,485)
1953.....	....	35,000	....
1954.....	....	62,000	....
1955.....	....	120,000	....
1956.....	160,919	104,000	(56,919)
1957.....	....	54,000	....
1958.....	....	90,000	....
1959.....	....	122,300 ⁴	....
1960.....	....	168,000 ⁵	....

¹ *Past and Present*, p. 123.

² *TGY*, p. 98.

³ Calculated from the equation $FLD - DWT = LSD$.

⁴ Planned production (*CHKYCP*, 1 Oct 1959, p. 4).

⁵ Planned production of "ships and barges" was to be 37% higher than actual production in 1959 (*PR*, 5 Apr 1960, p. 12). Actual production in 1959-60 was not reported.

Table A-2

Estimated Production of Merchant Vessels

Thousand Tons					
	FLD ¹	DWT ¹	LSD ²	LSD of Work Done ³	LSD/DWT Ratio
1951.....	Negl.	Negl.	Negl.	Negl.	....
1952.....	21.5	16	(5.5)	(6.1)	(0.34)
1953.....	....	35	(13.5)	(11.8)	(0.39)
1954.....	....	62	(26.9)	(31.4)	(0.43)
1955.....	....	120	(58.4)	(50.2)	(0.49)
1956.....	160.9	104	(56.9)	(51.4)	(0.55)
1957.....	....	54	(33.2)	(46.4)	(0.61)
1958.....	....	90	(62.2)	(56.6) ⁴	(0.69)

¹ From Table A-1.

² The figures for 1952 and 1956 were taken from Table A-1, and those for 1953-55 and 1957-58 are estimates extrapolated by the Kaplan-Moorsteen method (Norman M. Kaplan and Richard H. Moorsteen, *Indexes of Soviet Industrial Output*, Santa Monica, 1960).

³ These estimates of work actually done in each year were derived as a three-year moving average of LSD in which estimates for production during the preceding and following years were each weighted by 0.25 and production during the current year by 0.50.

⁴ In deriving the moving average, LSD in 1959 was taken from Table A-1. LSD of major ships (25.6) was added to LSD of minor vessels (43.0) to obtain total LSD (68.6). Thus, work actually done in 1958 was calculated as follows: $0.25 \times 33.2 + 0.5 \times 62.2 + 0.25 \times 68.6 = 56.6$. Note that, for minor vessels, it is assumed that LSD of ships launched = LSD of work done.

LSD figures so derived were then adjusted to account for the fact that the actual work of construction and fitting-out in shipbuilding is usually spread over a year or more. Accordingly, LSD in "work done" terms was estimated by use of a three-year moving average in which one-fourth of the work done each year was allocated to the preceding and following years and one-half to the current year.*

Derivation of LSD estimates for later years required much more complicated procedures. Essentially, the "hard core" of the estimates was China's sporadic announcements of major ships completed. For example, official sources reported the launching in 1958 of the *Hsiao P'ing 28*, an oceangoing freighter with a FLD of 8,730 tons and a DWT capacity of 5,000 tons.** The sum of other such tonnages for specific ships announced in 1958 was about 37,200 DWT tons, or about 40% of China's total DWT tonnage reported for that year. In 1959, similar reports yielded a DWT figure of some 37,700 tons, or about 30% of the planned total production of 122,300 tons. Based on these percentages, it was assumed that the DWT of announced major ship launchings typically constituted one-third of total merchant shipbuilding for 1959-73 and that barges, tugs, and other smaller vessels accounted for the other two-thirds.

With estimates of the minimum DWT tonnages of major ships launched each year, a technique had to be developed for converting DWT into LSD tonnages. On the basis of the relationships detailed in Table A-3, the average LSD was assumed to represent 68% of DWT. Derivation of the estimates for total output of merchant ships for 1959-73 is explained in the footnotes to Table A-4.

As a rough test of feasibility, the estimates were compared with a somewhat ambiguous Chinese claim that ships built *in each* of the years 1971-73 exceeded in tonnage China's total for the preceding decade.*** The estimates are in close agreement with the Chinese claim if the statement is interpreted to mean that total tonnage for the *entire period* 1971-73 exceeded the total for 1961-70. The estimates show a total of 804,200 DWT for 1971-73 and 766,600 DWT for 1961-70. Clearly, the phrase "in each year" is a mistake in translation; for that to be true, output in 1971, 1972, and 1973 would have to be enormous and output in 1961-70 would have to be almost negligible.

*Cf. Robert Michael Field, "The Chinese Machine-Building Industry: A Reappraisal," *China Quarterly*, No. 54, Apr-Jun 1973, pp. 313-314.

**JPRS, No. 514-D, 3 Feb 1959.

***PR, 15 Feb 1974, p. 22.

**Relationships Among Full Load Displacement, Light Ship Displacement, and Deadweight
Tonnes of Chinese Merchant Vessels**

Type of Ship and Year of Launching	Tons			LSD/DWT Ratio
	FLD	DWT	LSD	
Oil barge, 1955 ¹	5,100	3,700	1,400	0.38
Small tanker, 1971 ²	7,800	5,000	2,800	0.56
Ocean tanker, 1969 ³	22,000	15,000	7,000	0.47
Train ferry, 1957 ⁴	4,950	2,416	2,534	1.05
Train ferry, 1959 ⁵	5,090	2,878	2,212	0.77
River freighter, 1953 ⁶	2,700	1,800	900	0.50
River freighter, 1954 ⁷	2,000	1,000	1,000	1.00
Coastal freighter, 1959 ⁸	4,850	3,465	1,385	0.40
Ocean freighter, 1958 ⁹	8,730	5,000	3,730	0.67
Ocean freighter, 1958 ¹⁰	22,100	13,400	8,700	0.65
Ocean freighter, 1959 ¹¹	9,420	5,000	4,420	0.88
Ocean freighter, 1965 ¹²	18,800	11,700	7,100	0.61
Ocean freighter, 1967 ¹³	19,000	13,000	6,000	0.46
Ocean freighter, 1970 ¹⁴	20,000	12,600	7,400	0.59
Ocean freighter, 1973 ¹⁵	22,000	13,000	9,000	0.69
Small liner/freighter, 1958 ¹⁶	2,650	1,000	1,650	1.65
Total for the year				
1952 ¹⁷	21,485	16,000	5,485	0.34
1956 ¹⁷	160,919	104,000	56,919	0.55
Average of LSD/DWT ratios.....	....	....	....	0.68

¹ Tonnes were estimated from a photograph in *PC*, 16 Jan 1956, p. 19.

² The *Ta Ch'ing 409*, built by the Jung-hsing Shipyard in Tsingtao (*BBC/SWB/FE/W630/A/9*, 14 Jul 1971).

³ The *Ta Ch'ing 27*, built by the Hung-ch'i (Red Flag) Shipyard in Dairen. For photos and details of this ship and others of the same class, see *CR*, Aug 1969, pp. 2, 4; *CP*, No. 11, 1969, pp. 4, 5, 11, and No. 9, 1971, p. 16; *SCMP*, No. 4514, 10 Oct 1969, pp. 10-11; *BBC/SWB/FE/W611/A/8*; and *PR*, 24 Dec 1971, p. 21.

⁴ The *Shanghai*, built by the Chiang-nan Shipyard in Shanghai. See *JPRS*, No. 2850, 17 Jun 1960, pp. 59-61; *SCMP*, No. 1937, 20 Jan 1959, p. 30; and *SCMP*, No. 1955, 17 Feb 1959, p. 26.

⁵ The *Kiangsu* and *Chin Ling*, identical ships built by the Chiang-nan Shipyard in Shanghai. See the sources in footnote 4.

⁶ The *Ta Chung*, built by the Chung-hua Shipyard in Shanghai. See *Chugoku keizai no genjo to tembo* (Present Condition and Future Prospects of China's Economy), 1971 edition, published by the China Economy Research Bureau of Fuji Journal, Japan, p. 68; hereafter referred to as *Present Condition*.

⁷ The *Jen Min 1*, built by the Hu-tung Shipyard in Shanghai. See *Present Condition*, p. 68.

⁸ The *Ho P'ing 49*, built by the Shanghai Shipyard in Shanghai. For photos and details, see *JPRS*, No. 2850, 17 Jun 1960, pp. 1-49, and *SCMP*, No. 1955, 17 Feb 1959, pp. 25-26.

⁹ The *Ho P'ing 25*, built by the Hung-chi Shipyard in Dairen. For photos and details, see *JPRS*, No. 514-D, 3 Feb 1959, p. 1; *CP*, Dec 1958, p. 31; *CR*, Nov 1963, pp. 6-10; *PR*, 13 May 1958, p. 5; and *PR*, 30 Sep 1958, p. 17.

¹⁰ The *Yueh Chin*, built by the Hung-chi Shipyard in Dairen. For photos and details, see *CP*, 5 Jan 1959, pp. 24-25, and *PR*, 16 Dec 1958, p. 15.

¹¹ The *Ho P'ing 58*, built by the Chiang-nan Shipyard in Shanghai. For photos and details, see *SCMP*, No. 2139, 19 Nov 1959, p. 22; *CP*, 20 Oct 1959, p. 34; and *Evergreen*, Peking, No. 3, 1964, pp. 25-26.

¹² The *Tung Feng*, built jointly by the Chiang-nan and Hu-tung Shipyards in Shanghai. Several years were required to make this ship operational. For photos and details, see *SCMP*, No. 2246, 28 Apr 1960, p. 27; *PR*, 10 May 1960, p. 4; *CR*, Jun 1968, pp. 25-28, 44, and back cover; and *CP*, No. 6, 1968, pp. 20-23.

¹³ The *Ch'ao Yang*, built by the Chiang-nan Shipyard in Shanghai. For photos and details, see *China's Foreign Trade*, Peking, No. 1, 1974; *JMJP*, 14 Jan 1967, p. 3; *CP*, No. 4, 1967; *CR*, Apr 1967, pp. 1, 28, and inside back cover; and *Present Condition*, p. 69.

¹⁴ The *Feng Lei*, built by the Shanghai Shipyard in Shanghai. For photos and details, see *JMJP*, 10 May 1970, p. 2; *CR*, Sep 1970, pp. 26-28; and *FBIS*, 13 May 1970, p. C8.

¹⁵ The *Feng Ching*, built by the Chiang-nan Shipyard in Shanghai. For photos and details, see *JMJP*, 5 Nov 1974, p. 4; *FBIS*, 10 Oct 1974, pp. E1-2; and *FBIS*, 5 Nov 1974, pp. E1-6.

¹⁶ The *Min Chu 10* and *Min Chu 11*, identical ships built by the Chiang-nan Shipyard in Shanghai. For photos and details, see *PC*, 1 Dec 1955, p. 5; *PC*, 16 Jan 1956, p. 19; and *JPRS*, No. 188-D, 9 Jan 1955, p. 3.

¹⁷ From Table A-1.

Table A-4

	Estimated Production of Merchant Vessels						Thousand Tons
	Major Ships		Minor Vessels		Total		
	DWT of Ships Launched ¹	LSD of Ships Launched ²	LSD of Work Done ³	LSD of Work Done ⁴	DWT of Ships Launched ⁵	DWT of Ships Launched ⁶	LSD of Work Done ⁷
1959.....	37.7	25.6	21.5	43.0	63.2	100.9	64.5
1960.....	13.7	9.3	13.8	27.6	40.6	54.3	41.4
1961.....	16.2	11.0	9.4	18.8	27.6	43.8	28.2
1962.....	9.4	6.4	7.6	15.2	22.3	31.7	22.8
1963.....	10.0	6.8	8.6	17.2	25.3	35.3	25.8
1964.....	20.9	14.2	11.4	22.8	33.5	54.4	34.2
1965.....	15.5	10.5	9.7	19.4	28.5	44.0	29.1
1966.....	5.3	3.6	6.6	13.2	19.4	24.7	19.8
1967.....	13.0	8.8	7.5	15.0	22.0	35.0	22.5
1968.....	13.0	8.8	16.6	33.2	48.8	61.8	49.8
1969.....	59.0	40.1	36.2	72.4	106.4	165.4	108.6
1970.....	82.3	56.0	64.4	128.8	189.3	271.6	193.2
1971.....	155.2	105.5	77.3	154.6	227.3	382.5	231.9
1972.....	62.0	42.2	54.4	108.8	159.9	221.9	163.2
1973.....	41.0	27.9	53.6	107.2	157.6	198.6	160.8
1974.....	171.0	116.3	....	....	....	....	....

¹ These estimates should be considered minimum totals. They were compiled by adding up the tonnages of major ship launchings announced each year by the following Chinese newspapers and periodicals: *CP*, *CR*, *Evergreen*, *JMJP*, *PR*, and *TKP*. This information from direct sources was supplemented by translations of Chinese publications and monitored radio broadcasts by the *JPRS*, *SCMP*, *FBIS*, and *BBC*.

² Derived by multiplying column 1 by 0.68, the arithmetical mean of the 18 LSD/DWT ratios calculated in Table A-3.

³ Derived by the moving average method described in footnote 3 in Table A-2.

⁴ Derived by multiplying column 3 by 2.0. The assumption here is that work done on major ships typically accounts for one-third of total work done in any given year. This is based on the estimates for 1958-59, in which DWT of major ships launched accounted for about 30%-40% of total reported (1958) and planned (1959) production.

⁵ Derived by multiplying column 4 by 1.47, the reciprocal of the 0.68 figure used in column 2 (LSD = 0.68 x DWT; DWT = 1.47 x LSD).

⁶ Derived by adding column 1 to column 5.

⁷ Derived by adding column 3 to column 4.

APPENDIX B

Major Divisions of the Metal Processing Sector¹

Category Number	Category	Code Number
I	Power equipment.....	215-21842
1	Steam boilers.....	2151-2155
2	Boiler accessory equipment.....	2156
3	Steam turbines.....	2159-21615
4	Hydroturbines.....	2162-21624
5	Steam engines.....	2163-21632
6	Portable steam engines.....	2164-21642
7	Internal combustion engines.....	2165-2172
8	Gas producers.....	2173
9	Electric generators.....	2175-217723
10	Electric motors.....	2181-21842
II	Electric equipment.....	220-22475
1	Transformers.....	2201-22033
2	Mutual inductors for instruments.....	2205-22052
3	Switching equipment.....	2216-22164
4	Starting and control equipment.....	2219-22214
5	Safety equipment.....	2225-22294
6	Rectifying equipment.....	2231-22317
7	Electrical appliances.....	2234-22363
8	Electric light bulbs.....	2238-2242
9	Storage batteries.....	2245-22457
10	Dry batteries.....	2247-22475
III	Metal-cutting machine tools.....	225-23083
1	Lathes.....	2251-2259
2	Borers.....	2261-22612
3	Drills.....	2263-2267
4	Planers.....	2271-2273
5	Slotters.....	2274
6	Milling machines.....	2276-2284
7	Drawing benches.....	2238
8	Gear makers.....	2291-2295
9	Grinders.....	2301-23019
10	Thread cutters.....	2303-23033
11	Tool grinders.....	2305-23054
12	Metal saws.....	2306-23063
13	Other metal-cutting machine tools.....	2307
14	Electric spark machine tools.....	2308-23083
IV	Forging and pressing equipment.....	231-2348
1	Forge hammers.....	2311-2314
2	Presses.....	2316-2320
3	Forges.....	2341-23412
4	Punch presses.....	2342
5	Shears.....	2343-23433
6	Forming machines.....	2344-23445
7	Tube drawing benches.....	2348
V	Casting equipment.....	236-2366
VI	Geological prospecting equipment.....	240-24512
1	Testing drills.....	2401-24015
2	Manual punch-drill testing drills.....	2402
3	Hand-operated testing drills.....	2403
4	Hydrologic drills.....	2451-24512
VII	Water conservation construction equipment.....	246-2461
VIII	Ore dressing and washing equipment.....	249-25012
1	Dressing equipment.....	2491-24916
2	Sintering equipment.....	2501-25012
IX	Metallurgical equipment.....	251-2551
1	Metallurgical equipment for the ferrous metals industry.....	2511-25121

Major Divisions of the Metal Processing Sector¹ (Continued)

Category Number	Category	Code Number
2	Steel refining equipment.....	2515 25151
3	Steel rolling equipment.....	2517-2521
4	Other metallurgical equipment.....	2551
X	Coking equipment.....	258-2584
XI	Coal industry equipment.....	260-26261
1	Excavation machinery.....	2601-2613
2	Loading and transport equipment.....	2621-26252
3	Ventilation equipment.....	2626 26261
XII	Petroleum industry equipment.....	265-2683
1	Well drilling rigs.....	2651
2	Pumping well rigs.....	2652
3	Well drilling tools.....	2653
4	Oil well salvage (fish-up) tools.....	2654
5	Gusher prevention machinery.....	2655
6	Oil and gas extraction machinery.....	2656
7	Petroleum refining machinery.....	2657-26574
8	Gas station machinery.....	2681-26812
9	Barrel manufacturing machinery.....	2682
10	T'ing manufacturing equipment.....	2683
XIII	Chemical industry equipment.....	269-2786
1	Evaporation equipment.....	2691-26954
2	Absorption towers.....	2698-26982
3	Distillation equipment.....	2701-27013
4	Mixing equipment.....	2704-2707
5	Filtration equipment.....	2711-2713
6	Mechanical separation equipment.....	2715-2718
7	Drying equipment.....	2721-2725
8	Heating and cooling equipment.....	273-2732
9	Crystallization equipment.....	274-2741
10	Reaction equipment.....	275-2754
11	Mechanical furnaces for the chemical industry.....	2761
12	Other machinery.....	278-2786
XIV	Glass industry equipment.....	281-2819
XV	Building materials and refractory materials industry equipment	291-29156
1	Forming machines.....	2911-29114
2	Mechanical kilns.....	2912-29122
3	Drying machinery; cement kilns.....	2914-29143
4	Clay-working machinery.....	2915-29156
XVI	Lumbering and lumber milling equipment.....	295-2981
1	Lumbering machinery.....	2951-29516
2	Lumber making machinery.....	2955-29564
3	Lumber milling machinery.....	2961-29619
4	Pressed-board manufacturing machinery.....	2981
XVII	Paper industry equipment.....	300-30068
1	Raw material processing machinery.....	3001-30016
2	Pulp machinery.....	3004-30045
3	Papermaking machinery.....	3006 30068
XVIII	Match industry equipment.....	3011-30119
XIX	Weaving, knitting, sewing, and printing and dyeing industries equipment	304-3225
1	Cotton textile machinery.....	305-30819
2	Wool textile machinery.....	310-3106
3	Hemp textile machinery.....	311-3116
4	Silk textile machinery.....	315-3195
5	Knitting and sewing machinery.....	320-32151
6	Printing and dyeing machinery.....	322-3225
XX	Tanning and shoe industry equipment.....	323-32512
1	Tanning machinery.....	3231-32322
2	Shoe manufacturing machinery.....	3251 32512

Major Divisions of the Metal Processing Sector¹ (Continued)

Category Number	Category	Code Number
XXI	Printing industry equipment.....	328 32917
1	Type foundry machinery.....	3281 32814
2	Printing machinery.....	3285-32855
3	Lithographic plate machinery.....	3288-32887
4	Bindery machinery.....	3291-32917
XXII	Food industry equipment.....	333-35316
1	Flour milling machinery.....	3331-33322
2	Edible oils and fats industry machinery.....	3351 33534
3	Sugarmaking machinery.....	3355 33561
4	Rice milling machinery.....	3381-33814
5	Can manufacturing machinery.....	3402 340215
6	Noodle products machinery.....	3421-34213
7	Tobacco manufacturing machinery.....	3451-34519
8	Tea processing machinery.....	3471-34712
9	Distilling machinery.....	3491-34916
10	Egg processing machinery.....	3511-35114
11	Cold drink and icemaking machinery.....	3531-35316
XXIII	Rubber industry equipment.....	362 36371
1	Rubber preparation machinery.....	3621-36212
2	Masticating machinery.....	3623-36233
3	Forming machinery.....	3625-36254
4	Vulcanizing machinery.....	3631-36311
5	Cutting machinery.....	3634 36344
6	Extrusion machinery.....	3635-36352
7	Scraping machinery.....	3637-36371
XXIV	Specialized equipment for other industries.....	3651-3704
1	Wire and nail making machinery.....	3651-36514
2	Electric wire making machinery.....	3671-36715
3	Bicycle making machinery.....	3691-36913
4	Other specialized machinery.....	370-3704
XXV	Construction and roadbuilding machinery.....	390-3923
XXVI	Agricultural machinery.....	395-3984
1	Tilling tools.....	3951 39552
2	Sowing machinery.....	3957 3961
3	Cultivating machinery.....	3962 3961
4	Harvesting machinery.....	3971 3975
5	Fertilizer applicators.....	3976-39762
6	Pesticide machinery.....	3978-39783
7	Irrigation water-lifting machinery.....	3979-39792
8	Fodder machinery.....	3980 39804
9	Grain sorting machinery.....	3981
10	Processing machinery.....	3982-398242
11	Windmills.....	3984
XXVII	Tractors.....	399-39983
	a. 15-horsepower units.....	3991
	b. Actual units.....	3992
1	Caterpillar tractors.....	3993-39933
2	Wheeled tractors.....	3995-39983
XXVIII	Railroad rolling stock and equipment.....	401-40421
1	Steam locomotives.....	4011-40123
	Steam locomotives, by type.....	4012
2	Diesel locomotives.....	4015
3	Electric locomotives.....	4016
4	Passenger cars.....	4017-40178
5	Freight cars.....	4021-40226
6	Parts for locomotives, passenger and freight cars.....	4025-40281
7	Rail line tools and materials.....	4031-40319
8	Signal equipment.....	4041 40416
9	AC line relays.....	40417
10	DC nonpolarized line relays.....	40418 40421

Major Divisions of the Metal Processing Sector¹ (Continued)

Category Number	Category	Code Number
IXXX	Streetcars and parts	408-40867
XXX	Merchant vessels	419-4273
	Self-powered boats	4190
1	Seagoing boats	4191-4195
2	Coastal boats	420-4205
3	Inland-waterways boats	421-4215
4	Special boats	423-4239
5	Working boats	4251-4262
6	Other boat machinery	427-4273
XXXI	Motor vehicles and parts	430-44155
	Motor vehicles	4301 4305
	Motor vehicle parts	4321
1	Vehicle engine parts	4322-43245
2	Front axle and steering mechanism parts	4331
3	Transmission parts	4351-43516
4	Rear axle and differential parts	4371
5	Brake system parts	4391
6	Shock-absorber parts	4411
7	Body parts	4413-44134
8	Other parts	44151-44155
XXXII	Roller bearings	444-44442
XXXIII	Telecommunication equipment and parts	446-44814
1	Wire telegraph equipment	4461-44614
2	Telephone equipment	4463-44633
3	Telephone exchange equipment	4464-44644
4	Augmenters	4466
5	Wave carriers	4467
6	Wireless transmitters	4468-44683
7	Wireless receivers	4469
8	Small transceivers	4470
9	Radio receivers	4471
10	Amplifiers	4472
11	Broadcasting equipment	4473
12	Telecommunication equipment major parts	4477-44781
13	Hand-operated generators	4480
14	Electronic tubes	4481-44814
XXXIV	Hoisting and transporting equipment	450-45264
1	Elevators	4501-45012
2	Cranes	4502-4509
3	Transport machinery	4521-45216
4	Light mine and industrial railway rolling stock	4523-45264
XXXV	Pumps and air compressing equipment	454-45614
1	Pumps	4541-45418
2	Air compressors	4551-45513
3	Common air blowers	4561-45614
XXXVI	Crushing and grinding equipment	458-4588
XXXVII	Welding machinery	460-4604
XXXVIII	Industrial tools	462-46852
1	Cutting tools	4621-46218
2	Hand tools	4651 46517
3	Woodworking tools	4655 46553
4	Clamping tools	4661 46613
5	Pneumatic tools	4663-46633
6	Electric tools	4665-46653
7	Measuring tools	4667-46675
8	Grinding tools	4669-46695
9	Molding tools	4681-46814
10	Turning tools	4685-46852
IXL	Industrial equipment	470-4707
XL	Heating equipment	4801 4808

Major Divisions of the Metal Processing Sector¹ (Continued)

Category Number	Category	Code Number
XLI	Firefighting equipment.....	483-48362
1	Firefighting machinery.....	4831-48312
2	Fire extinguishers.....	4832-48322
3	Fire hydrants.....	4834
4	Fire engines.....	4835-48352
5	Fire ladders.....	4836-48362
XLII	Medical instruments.....	485-48923
1	Pharmaceutical machinery.....	4851-48517
2	Chemical pharmaceutical apparatus.....	4881-48814
3	Medical instruments.....	4891-48923
XLIII	Meters and testing equipment.....	493-49975
1	Inspection equipment.....	4931-49320
2	Instruments and meters.....	4941-49975
XLIV	Motion picture machinery and parts.....	510-5114
XLV	Electric wires.....	516-51914
1	Copper wires.....	5161-5166
2	Aluminum wires.....	5168-51681
3	Electric cables.....	5170-51725
4	Other alloy and metal electric wires.....	5191-51914
XLVI	Metal structures.....	5201-5212
XLVII	Cultural and consumer products.....	5331-5502
XLVIII	Metal products.....	6011-60538

¹ State Statistical Bureau, *Kung-yeh ch'an-p'in mu-lu (Index of Industrial Commodities)*, Peking, 1953, pp. 41-85.